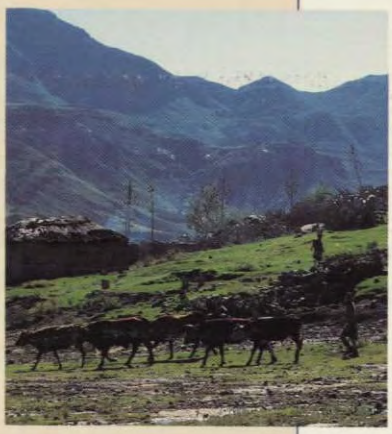
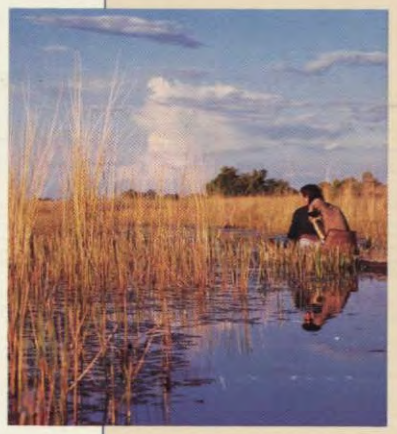
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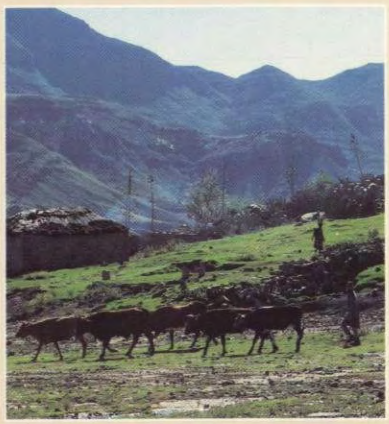
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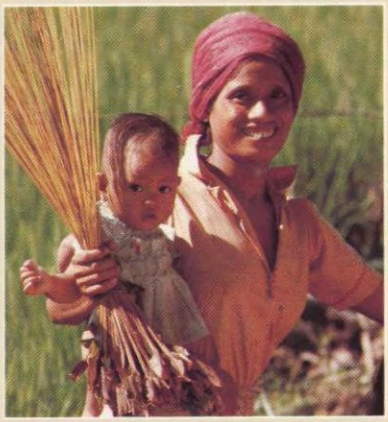


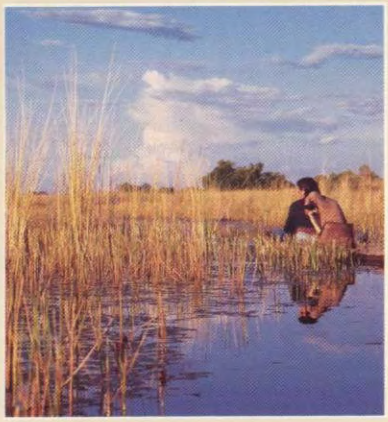




THE ENVIRONMENTAL CHALLENGE OF DEVELOPMENT







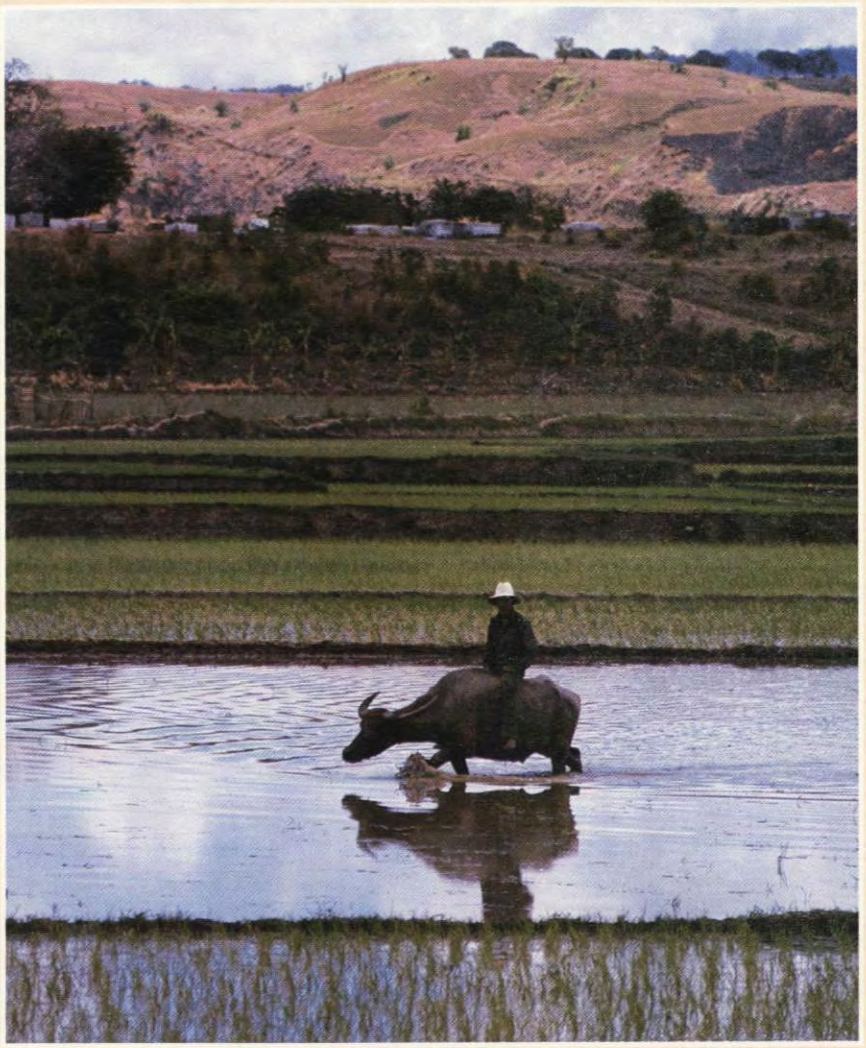
From top:
Farmland in Lesotho.
Harvest in Indonesia.
Wetlands in Botswana.

THE WORLD BANK

Striking a Balance

THE ENVIRONMENTAL CHALLENGE OF DEVELOPMENT





A rice paddy in the Phillipines.

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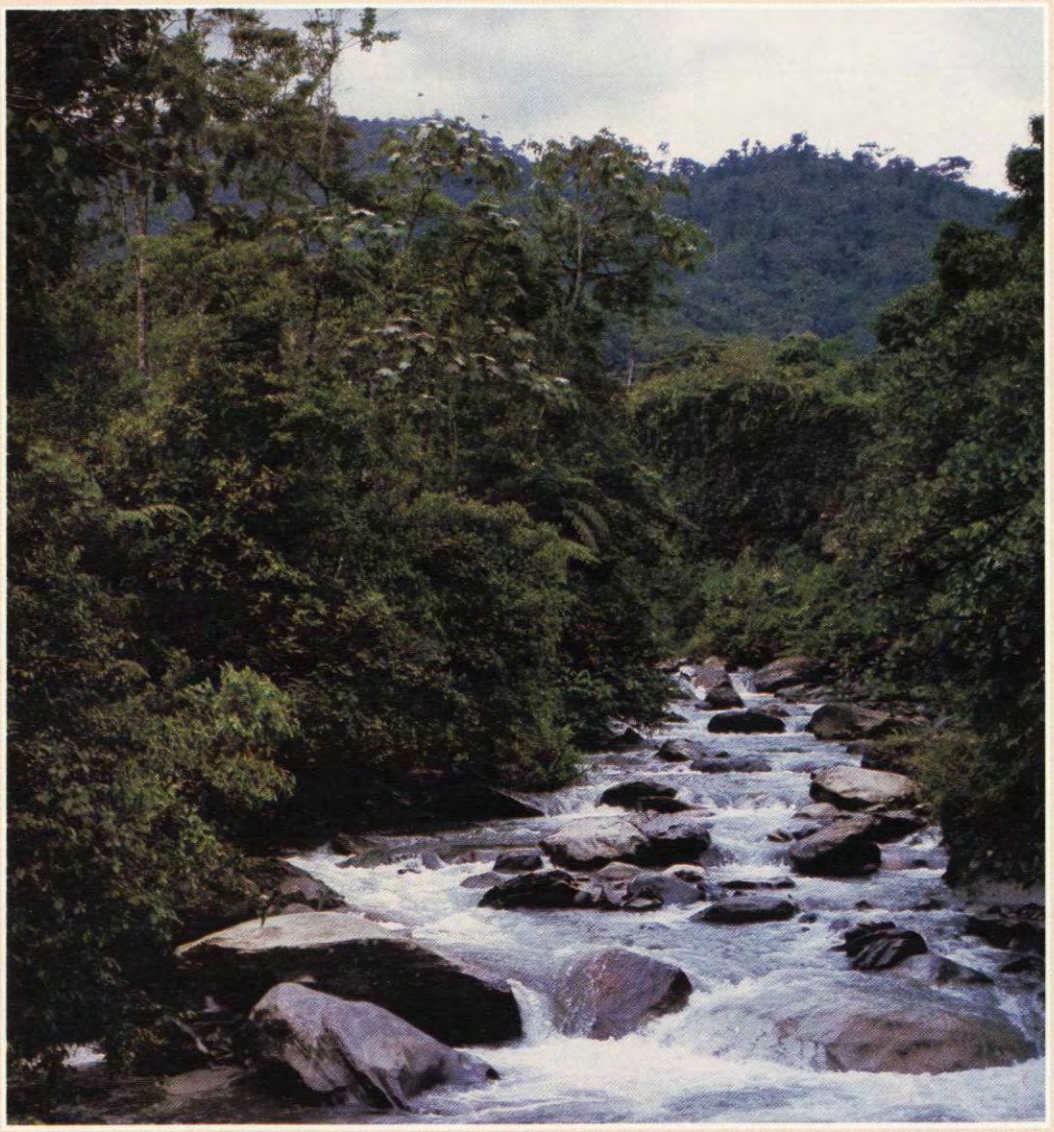
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A rain forest in Ecuador.

A New Era of Environmental Understanding

When Charles Darwin set forth on his historic travels aboard the *Beagle,* the lands he encountered in his around-the-world voyage were cornucopias of life. While some species of plants and animals would be lost through natural selection, Darwin viewed the process in a positive light: the long-term trend of life on the planet was toward stronger survivors. Darwin saw a world plentiful in resources of water, air, and land.

The sweep and optimism of Darwin's vision 150 years ago are conveyed in one of the most majestic passages of *The Voyage of the Beagle:*

> *Among the scenes which are deeply impressed on my mind, none exceed in sublimity the primeval forests undefaced by the hand of man; whether those of Brazil where the powers of Life are predominant; or those of Tierra del Fuego, where Death and Decay prevail. Both are temples filled with the varied productions of the God of Nature... From seeing the present state, it is impossible not to look forward with high expectations to the future progress of nearly an entire hemisphere.*

For developing countries, curbing poverty, improving the quality of life, and safeguarding the environment must be mutually supportive objectives.

Darwin's stirring ideas shaped modern biology. But his optimism has given way to ominous concerns that species are being lost at alarming rates and that forests, water, and air are being despoiled—by man.

Mounting concern about the health of the environment has run headlong into traditional ideas about material progress, which have emphasized economic growth over resource conservation. The issue is particularly acute for developing nations, which have the greatest unmet needs and, in some cases, the greatest untapped resources.

The World Bank, the largest institution devoted to economic development, is seeking ways to strike a balance that will conserve resources while promoting economic development around the world.[1]

[1]The World Bank Group comprises the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA). They are referred to collectively here as the Bank.

That task is daunting. The scope of environmental degradation—current and projected—is staggering. Eleven million hectares of tropical forests are felled annually. At current rates of depletion, most of Asia's forests could disappear in the next century. Every year, 20 million hectares of agricultural land is lost to soil erosion. Acute water shortages combined with pollution now cause 25,000 deaths a day.

At the same time that environmental deterioration has continued at alarming rates, the list of environmental concerns, both physical and philosophical, has grown. New problems facing the planet include acid rain, the depletion of the ozone layer, the greenhouse effect, and the movement and illegal disposal of hazardous wastes. It is now recognized that some damage to the environment is difficult, if not impossible, to reverse. Water pollution can be cleaned up, albeit at considerable political, social, and economic cost. But once plant and animal species are lost, they can never be retrieved. With rapid deforestation and destruction of wetlands, one-fifth of the world's plant and animal species could become extinct in the next two decades. These irreversible losses, far greater than anything Darwin imagined, have stripped the planet of plants and animals not only valuable in their own right but also valuable to people as improved foods, medicines, and fibers.

Environmental problems are all the more difficult because they are inseparable from the problems of development generally. Poverty drives people to place intolerable demands on their natural resources. The poor in many developing countries search relentlessly for fuelwood; they often cannot afford pollution abatement technology. High rates of population growth, combined with urgent economic problems in some countries, exacerbate pressure on the environment all the more. Without a doubt, long-term economic growth depends on protecting the environment. But decisionmakers, with limited financial resources, are often forced to compromise the environment in order to meet the urgent needs of the people they serve.

Another billion people, the combined total of the current populations of Africa and Latin America, are likely to be added to the earth by the turn of the century. No single factor contributes more to environmental deterioration in developing countries than rapid population growth.

Global Population Growth Over Time

BC 200
190 Million

AD 1000
265 Million

Analytical tools and practical programs have only begun to catch up with environmental problems. Basic economic record-keeping, such as that to measure national economic growth, does not adequately take account of environmental destruction. Development activities that meet traditional economic criteria may do great damage to the environment. Placing a value on species of plants and animals that have yet to be studied requires a fundamental reassessment of environmental-economic relationships.

Until recently, developing countries have generally regarded environmental protection as a luxury that only rich countries could afford. Today, these nations face overwhelming evidence that their future development is threatened by environmentally unsound practices, such as farming marginal land, clearing forests, permitting industrial pollution, and poisoning soil and water through improper use of pesticides.

For their part, industrial nations have come to see that maintaining a healthier environment at home depends on better management of natural resources both at home and abroad. Increasingly complex environmental problems—from climatic warming to loss of species—spill across international boundaries and become global problems. Industrial countries must adopt measures to check extravagant use of resources by their citizens and curb practices that pollute air, land, and water. They must also assist developing nations in arresting environmental destruction within their borders.

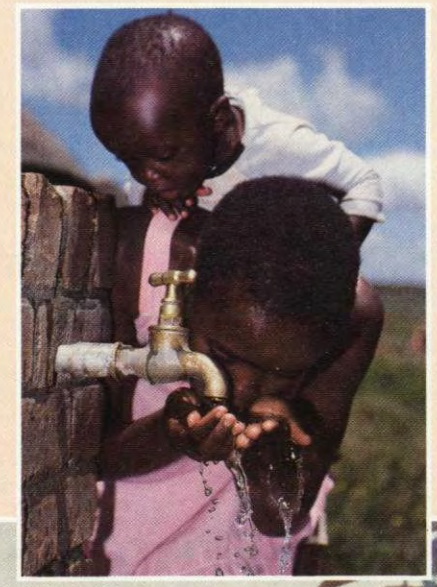
Successfully meeting these environmental challenges requires a new balance in development involving all nations. Contemporary needs must be met without compromising the ability of future generations to live healthy, prosperous lives. Curbing poverty, improving the quality of life, and safeguarding the environment must be mutually supportive global objectives. The goal, as the World Commission on Environment and Development and other international bodies have affirmed, is sustainable development: a new era in which all countries learn to manage natural resources, not exhaust them. ■



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Striving to meet the needs of man and nature. About one-third of all new Bank projects have environmental components, including steps to provide clean drinking water and to promote environmentally sound farming methods. Top: A mother and child in Lesotho. Bottom: A farmer in Nepal holds a fruit tree that provides food, fodder, and fuel.

Making the Environment a Bank Commitment

To achieve balanced, sustainable development, the World Bank is moving to integrate environmental considerations into its work: whether in carrying forward traditional project lending, designing special environmental projects, or discussing national policies with borrowing countries; whether in training Bank staff or providing environment seminars for officials in developing countries; whether in research or in evaluating completed projects. The goal is to blur the lines between environmental activities and the rest of the Bank's work—to make them one.

This marks a major redirection of World Bank activity. Although the Bank did not ignore environmental issues altogether in the past, it did not give them sufficient attention. The dangers of understating environmental concerns, however, have become progressively clear. Governments and their publics have begun to see better environmental management as a priority. The Bank, along with other development institutions, has had to change.

The Bank's goal is to blur the lines between environmental activities and the rest of the Bank's work—to make them one.

One of the first steps to give more attention to the environment came with the World Bank reorganization in 1987. The environmental staff have increased sevenfold. A new central Environment Department provides research, long-term planning, training, and coordination with other parts of the Bank. Newly created environment divisions now exist in each of the Bank's four regional offices: Africa; Asia; Latin America and the Caribbean; and Europe, the Middle East and North Africa.

Beyond this—and even more crucial—is the Bank's emphasis on involving professional staff in environmental work. The central Environment Department is conducting a broad-based training program. "The aim," says Kenneth Piddington, director of the department, "is to have 4,000 environmentally sensitive staff in the Bank." Nearly 10 percent of Bank staff participated in environmental training sessions in the 1989 fiscal year—and such training is spreading to Bank offices abroad. Seminars and workshops have examined issues such as the environmental impacts of large dams and pesticide use. Staff from many disciplines participate in special environmental task forces that address deforestation, the spread of deserts, and biological diversity, among many other topics.

New procedures require that environmental considerations be taken

Planning Environmentally

The Bank has initiated and participated in studies to introduce explicit environmental considerations into development planning and activities. These studies are means to an end: building developing countries' capacity to protect the environment.

The first class of studies, prepared for internal Bank use, are descriptions of the environmental problems facing each borrowing country. These inventories discuss underlying environmental problems, as well as the constraints—legal, institutional, managerial, and technical—that hamper solutions. *Environmental issues papers,* as they are called, have been prepared for more than seventy borrowing countries. Issues papers for the remainder of the Bank's borrowers will be completed by 1990. The papers help Bank staff to take the environment into account in developing country programs.

In a second class of studies, the Bank helps countries create national strategies to protect their own natural endowments. These *environmental action plans* provide the framework for integrating environmental considerations into a nation's economic and social development planning. The plans are less a document than a process. They grow out of the country's own thinking and planning, and they draw on a range of views, including those from local and international nongovernmental organizations, as well as other international donors. In identifying and analyzing a country's environmental problems, the action plans can address the entire range of critical environmental concerns a country faces (see box on Madagascar, page 12) or concentrate on a narrower set of issues. One study for Indonesia focuses on four of the most important environmental problems facing the country: loss of forests, land degradation, water shortages, and water pollution. The Bank plans to help thirty countries complete environmental action plans by the end of 1992.

Where environmental problems spread across national boundaries, the Bank is beginning to prepare and participate in *regional studies.* For major Asian cities facing rapid urbanization, industrial pollution, and general environmental neglect, the Bank is helping to prepare the Capital Cities Clean-up Assessment, leading to action-oriented clean-up programs. The World Bank and the European Investment Bank have joined forces in studies leading to the Environmental Program for the Mediterranean, which will promote environmentally sound policies and investments in the region. This complements the scientific studies and public awareness activities of the United Nations Environment Programme (UNEP) in the Mediterranean. The queen of seas, as the Greek poet Homer called the Mediterranean, is seriously polluted; wildlife habitats, forests, and cultural sites along its rim are in jeopardy. The program could set an example for the whole world on the role of development banks in protecting the environment of an entire region.



Garbage piles up beside the Mediterranean. The World Bank and the European Investment Bank are involved in a major regional effort to clean up the sea and coastal areas and promote environmentally sound policies and investments in the area.

into account at every stage of the project cycle, from identification of new initiatives through implementation. All projects require clearance from the regional environmental divisions before a loan may be negotiated. New environmental assessment guidelines will require a standard methodology for assessing the environmental impacts in projects. The guidelines will ensure that potential environmental consequences are identified as early as possible. They will also provide a formal mechanism for addressing concerns of potentially affected parties and NGOs, as well as facilitate interagency coordination.

With increased environmental staff and changes in procedures, the Bank is better able to incorporate environmental considerations into project design and to identify projects that have environmental improvement as their principal goal. About thirty major projects centering on the environment are expected to be approved by 1992. In addition, more than one-third of all new projects have environmental components, including measures to deal with potential adverse environmental impacts. In lending for agriculture, for instance, the Bank is pursuing activities ranging from environmentally sound farming practices to research on biodiversity and tropical forestry. There are now energy projects that encourage resource conservation as well as the development of appropriate technology. Through transportation, industry, and urban development loans, the Bank promotes pollution control.

The Bank has also begun to find ways of introducing environmental issues into its structural adjustment lending. These loans address overarching national economic issues, including price, subsidy, and export policies. All can have an impact on the environment, although the implications are not always clear. Environmental objectives were explicitly addressed in four of the fourteen structural adjustment loans approved in fiscal year 1989. Other structural adjustment loans incorporated agreements related to environmental protection, including steps to reduce pesticide subsidies and to make more efficient use of natural resources, such as water and fuel.

The policy dialogue with developing countries on structural adjustment is part of a larger process of give-and-take that now also incorporates the environment. Country strategy papers, prepared to facilitate economic discussions with Bank borrowers, have begun to address the long-term quality and sustainability of development, including issues of natural resource depletion and population growth. The new requirements for environmental assessments and the development of environmental strategy documents (see the box on planning environmentally, opposite) provide other tools for weaving the environment into policy discussions with countries. This dialogue not only enhances the Bank's capacities to manage today's problems, it also helps developing countries develop the capability to do the job themselves. ■

The Environmental Action Plan for Madagascar

Madagascar, the site of one of the first environmental action plans, lies like a biological jewel off the east coast of Africa. After breaking away from the continent 165 million years ago, the island ran its own evolutionary course. Within its waterbound borders lie more unique forms of plants and animals than in any other country in the world. It has an estimated two-thirds of the world's species of chameleons, and the world's only lemurs. Among Madagascar's 10,000-odd plants is the dainty rosy periwinkle, which contributed to a cure for childhood leukemia.

Whether this jewel will continue to shine, however, has become a grave and urgent concern. The island's 11 million Malagasy—as the people of Madagascar are called—are poor, and their numbers are growing. In the push to create new farmland, one-half of the rain forest has been lost since 1950. Some argue that because of the fragile soil structure, the country holds the world's record for erosion. As the natural habitat of flora and fauna shrinks, unique species will be lost—forever.

To help arrest Madagascar's worrisome biological course, the Bank in 1987 participated in an environmental investigation with the country. Initially, the Bank thought of conducting an environmental review. But hearing this, as one staffer recalled, the French-speaking Malagasy said, "Mon Dieu! Not another study. We need action." Out of this perception that the time was long past for mere study arose the concept of an environmental action plan, which would give foundation and direction to concrete programs in the field.

"This is an attempt to encourage governments to develop their national environmental strategy together with their action plan," says François Falloux of the Environmental Division in the Bank's Africa region. "There is no time to be lost. These plans are not for the shelves but to guide people in protecting their biological patrimony and developing it in a sustainable manner."



Environmental action plans, as they have evolved, are *national* programs supported by donors and nongovernmental organizations. In the case of Madagascar, the World Bank team worked with some 150 Malagasy experts. Other groups included the World Wildlife Fund, which had already extensively studied biodiversity on the island, the U.S. Agency for International Development (USAID), Cooperation Suisse, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), and the United Nations Development Programme (UNDP).

One priority that emerged was the need to protect and manage Madagascar's amazing variety of plant and animal species through a chain of biological reserves. Another goal was to create a program for land tenure, which, among other things, would give people greater incentives to care for their landholdings. The action plan also called for public education programs on the environment and building national capacities to manage environmental issues generally.

The action plan has already led to policy changes. Environmental assessments by the government of new development schemes are on their way to becoming routine; concern over soil and water conservation has grown. The action plan has also paved the way for environmental programs sponsored by a variety of aid agencies, including the Bank. A Bank-funded environmental project will include watershed management, protection and management of biological diversity, the development of environmental information systems to improve resource management, and institution building and training.

Environmental action plans have followed similar patterns in other

countries: The Bank becomes involved when invited by governments; it then works with governments to ensure national support for future action—particularly by considering the interests of people throughout the country. Typically, action plans outline a combination of legislative, regulatory, and administrative steps to keep the process in motion.





Human needs compete with Madagascar's forests. Malagasy cut and burn trees to grow subsistence crops and gather firewood and charcoal for cooking fuel. The red-brown streaks that appear in the satellite photo (opposite page) are streams of soil being carried from cleared forests. Environmental destruction threatens Madagascar's abundant wildlife.
(Top) A family of lemurs.
(Middle) A chameleon.
(Bottom) Madagascar's rain forests are only a fraction of their original size.





Sampling soil in a Bank-backed forestry project in Bangladesh.

Learning and Adapting

Environmental consequences of economic policy decisions are complex and far-ranging. Air pollutants produced by oil and coal combustion travel hundreds of miles to shower down as acid rain. Acidity can build for years with seemingly little harm—until it exceeds the natural buffer capacity of the land and water, when it can devastate forests, lakes, and streams. Construction of roads and dams can destroy habitat for plants and animal species, an historic bridge or other cultural property, or ancient ways of life among local tribes (see the box on tribal people, page 18). To fail to foresee such environmental complexity is to invite unanticipated—and disastrous—environmental repercussions.

Over the years the Bank and developing countries have learned through experience that it is bad economics to ignore the environment (for example, see box on Mauritius, page 16). To better anticipate and deal with a wide array of environmental consequences, the Bank has taken steps to broaden its perspective and become more flexible in its work.

"A basic truth is that development cannot be halted, only directed. With the developing nations, we must go on learning by doing. If the World Bank has been part of the problem in the past, it can and will be a strong force in finding solutions for the future."

Barber Conable
World Bank
President

Working with NGOs

The Bank, in concert with partner governments, is working more closely with nongovernmental organizations (NGOs) such as farm cooperatives, charitable organizations, and international and local environmental groups. Experience has shown that NGOs in developing countries can help ensure that projects are tailored more closely to local environmental circumstances.

Bank staff have begun to collaborate with NGOs in planning and research. Bank environmental staff meet with local groups from Africa, Asia, Europe, the Middle East, and Latin America and with other international development institutions to examine ways to increase local participation in projects. Staff also work with international NGOs: for example, the Africa regional office of the Bank is working with the World Resources Institute, exploring links between environmental and economic policy objectives among countries in the region.

One example of collaboration has come in Kenya. To help curb

Why It Is Bad Economics to Ignore Nature

Mauritius was made first, and then heaven," American writer Mark Twain said; "heaven was copied after Mauritius."

The island of Mauritius, lying in the Indian Ocean, is still a paradise with shimmering beaches and some of the best fishing in the world. But the perpetual existence of such natural splendor is not guaranteed. Always, as people seek to progress economically, they must beware of the long-term consequences for their environment.

In the mid-1970s Mauritius became worried about its economic prospects. The world price for sugar, its chief source of foreign exchange, plummeted. The price of imported oil shot up. The country's external debt soon tripled.

With a per capita gross national product of about $1,600 a year, Mauritius realized that it had to take action. Supported in part by the World Bank and the International Monetary Fund (IMF), it launched a program to stabilize its economy. That program encouraged manufacturing for export, as well as tourism.

The economy rebounded. Garment production, particularly, led the way. By 1987, manufacturing's share of the economy was more than 50 percent greater than the sugar sector's. Tourism also increased, from 100,000 visitors in 1980 to over 200,000 in 1987. Unemployment in 1988 was less than 5 percent and inflation less than 1 percent a year.

Then a new set of problems began.

In the rush to develop, not enough attention had been paid to Mauritius' environment. The textile factories and dye houses poured untreated liquid wastes into the land and rivers. Ground water was becoming contaminated. Industrial and sewerage effluents were killing the coral reefs that attracted visitors. Fish catches were declining.

The island faced a new crisis: how to stop the destruction and correct the damage. At the World Bank-IMF annual meetings in 1987, Mauritius' finance minister asked the Bank to help. Within a few weeks, Bank staff were assisting the government in developing an environmental action plan.

Investigation showed that industrial treatment plants were needed—and that it was cheaper to move the geographically scattered factories and dye houses into a single industrial park than to create separate treatment facilities.

In addition to these suggestions, which were reviewed in a public forum and adapted by the government, the action plan outlines a master plan for institutional and legislative reform to ensure equitable and efficient natural resource management throughout the country. The plan details steps to protect endangered species. It also encourages the involvement of local NGOs.

Less than a year after work on the plan began, international donors met in Paris and pledged $90 million in aid for the environmental investment program. The World Bank pledged $25 million for an infrastructure project, and the UNDP provided funding for a program of technical assistance that will be managed by the Bank.

This is not the first time an environmental crisis has befallen Mauritius. The first humans arrived in the sixteenth and seventeenth centuries. They cut the ebony rain forest. They imported plants and animals that competed with native flora and fauna. The fabled dodo bird, among other island life, became extinct.

The difference this time is that the people of Mauritius are correcting the problems before it is too late. And they have a national plan, so they won't overlook environmental costs while they press forward to secure economic benefits for present and future generations.

"One comes to the disarming realization that nobody actually is to be blamed" for the ease with which the environment can be taken for granted, A. K. Aubeeluck, a Mauritian official, wisely noted during a public meeting on the plan. "Yet everybody in one way or the other is responsible for the gradual degradation of the environment."



This species of clownfish, found only around Mauritius, will be protected by the national environmental plan that the World Bank, with the support of other donors and NGOs, helped the Mauritians draft and implement.

population growth, which leads to greater demands on natural resources, the Bank helped create and funded an umbrella group of Kenyan NGOs, the National Council for Population and Development. The council coordinates information and educational activities to create demand for family planning services delivered by the government. In the neighboring country of Uganda, an international NGO, CARE (the Committee for American Relief Everywhere) is working with the government forestry agency to help implement a Bank-funded project that calls for greater community involvement in managing forests. In the Singrauli area of India, the Bank and the Indian government are taking steps to correct environmental problems in an area of intensive energy development (including a Bank-financed power project) after NGOs voiced their concerns.

In addition to seeking advice directly from NGOs, the Bank sometimes hires environmental NGO staff—for instance, from the Environmental Problems Foundation of Turkey—as consultants to assist in projects and research. The Bank publishes a list of planned projects with potential for NGO involvement. The list contains more than 200 projects, many of them environmental in nature. The Bank recently decided to make available to NGOs and others its operational policy directives.

Working with Governments

The Bank's relations with developing country governments require considerable sensitivity. Environmental issues typically involve conflicting interests. Proposals that change land ownership, for example, often alter the distribution of wealth and power in a society. While the Bank reserves the right to participate or not in a project or policy requested by the government, it must honor governments' sovereignty over all matters within their borders.

Working within this framework, the Bank has found that it is important to broaden the range of government agencies with which it works on environmental protection. The lesson was vividly conveyed in the wake of the Carajas iron ore project in Brazil. Initially, the Bank-financed project worked so well environmentally that the UNEP used it as a case study. But problems arose when a different government agency, with its own finances, began separately to promote pig iron smelting in the region without adopting the environmental precautions in the earlier, Bank-supported mining project. Among other things, the smelters in the new scheme demanded large quantities of charcoal from natural forests. Prompted by

the complaints of local and international NGOs, the Bank is now helping with an energy options study, looking at the environmental issues related to pig iron and steel production in the region.

"Most developing countries are now sensitized to environmental issues, which was not the case ten years ago," said Jane Pratt, chief of the Bank's Environmental Operations and Strategy Division. To promote this trend, the Bank tries to support programs that build environmental consciousness throughout governments. The Bank, for example, is currently developing projects to add environmental staff to Brazil's national and regional agencies in charge of national forests, parks, and tribal peoples.

Protecting Tribal Peoples

The Bank's policy on tribal peoples steers a middle course between rapid acculturation, on the one hand, and stagnation in "living museums," on the other.

When the World Bank began to work more often in remote rural areas of Brazil, Indonesia, and other countries in the late 1970s and early 1980s, it encountered human problems—those of isolated indigenous peoples—that matched any challenges posed by nature.

Projects to build roads and dams can displace or at least disrupt tribal peoples living in time-honored ways. Recognizing this, the Bank established guidelines in 1982 for protecting tribal peoples, many of whom had much to teach the world about coexisting with fragile ecosystems.

The Bank's policy steers a middle course between rapid acculturation, on the one hand, and stagnation in "living museums," on the other. It intends to ensure that projects do not destroy the traditional way of life of people who have had little contact with outsiders. In the case of tribes that have sought greater interaction with outsiders, Bank policy is aimed at facilitating their development while preserving their identity and protecting their individual and collective rights to ancestral lands and the natural resources upon which they depend.

The guidelines direct the staff to ascertain whether tribal agencies or other responsible groups in developing countries are able to protect indigenous peoples as projects proceed. If not, the Bank must provide support to that end or forgo the project.

The Bank continues to explore ways of implementing the guidelines effectively and adapting them to circumstances beyond those of people living in remote tropical forests. As part of the continuing effort to refine the guidelines, the Bank's African region is preparing special guidelines on the identification and treatment of tribal people affected by Bank projects in Sub-Saharan Africa. The Bank has added staff with anthropological and sociological skills to each region to help cope with these issues.

Taking Environmental Action in Projects

Through experience—and mistakes—the Bank has been learning how to be more watchful at each step of project development and supervision.

The Bank looks for problems earlier in project planning.

This allows the Bank to shelve unsound projects before any damage is done. Among those which have been cancelled are a hotel development in Turkey that would have disturbed one of the major breeding grounds of the loggerhead turtle; a gold mining project that would have adversely affected a coral reef in Papua New Guinea; and a food irradiation plant in Thailand that could have exposed workers to radiation.

Recognizing that it is often easier to prevent a problem than cure it, the Bank routinely urges borrowers to take measures to minimize the environmental costs of its industrial projects. More than 1,500 projects financed by the World Bank include ameliorative or preventive components such as installing pollution control equipment or dealing with toxic waste (see also box on dealing with disasters, page 20).



A rare Patagonian conure. When the Bank learned that a proposed Bank-funded dam in Chile could disturb some of the parrots' breeding sites, the birds were moved to other suitable breeding areas. The Bank also funded a program to protect parrots in other areas.

The Bank has begun to monitor projects more carefully and address environmental problems discovered during implementation.

In Chile, for example, the Bank learned that a proposed Bank-financed dam would disturb at least two of the twelve known breeding sites for an endemic parrot, the Patagonian conure. The rare birds were moved from the project site to other suitable breeding areas. The Bank also financed a program to protect parrots in other areas and to breed them in two zoos.

The Bank has also cut back projects when analyses showed that environmental risks are too high. In Brazil, a plan to place 15,000 families in new settlements was curtailed when analyses showed the soil in the project area had low fertility and was unsuitable for wide-scale cultivation.

"This was part of a broader strategy to adjust the course of the Polonoroeste project" to open northwestern Brazil to settlement, said Maritta Koch-Weser, senior Bank sociologist for Brazil. "In 1985, the Bank decided that no further infrastructure investments should be made unless

Dealing With Disasters

In May 1987 fire broke out in the Black Dragon Forest, a magnificent expanse of larch and white pine in remote northwest China. The fire raged for a month. When finally quenched, it had burned almost 1 million hectares of forest. Nearly 200 people had died. Some 56,000 had lost their homes.

The World Bank is not a disaster relief agency. But as a development bank, it has learned the value of mitigating environmental calamities that threaten long-term development. The Black Dragon fire was such a case.

Within a year of the fire, the Bank had approved a project to help the Chinese in the remote affected province rejuvenate the forest and, equally important, establish a fire protection system to avert such disasters in the future. The project also supported recovery of timber from trees killed but not destroyed in the fire. The salvageable timber was estimated to equal three years of softwood imports for China.

Another typical World Bank emergency loan came after the 1983 earthquake in Popayan, Colombia. The loan gave the government a quick infusion of money, so that rehabilitation could start right away. In another instance, working with NGOs and other development agencies, the Bank coordinated reconstruction in the wake of Sudan's 1988 flood.

The Bank's ultimate goal in dealing with natural disasters is to prepare for calamities before they occur and thereby reduce their effects. "Here in the Environment Department," says Alcira Kreimer, an urban environmental specialist in charge of the Bank's program on natural disasters, "we're working on ways to make countries more resistant to natural disaster."

One example is in Mexico. As a follow-up to a reconstruction project after the 1985 earthquake, a nationwide prevention project will structurally reinforce existing hospitals and schools and will promote safer, low-cost construction techniques. The project will also promote the use of prevention and mitigation technologies and provide training for inspectors and builders.



Mexico City's buildings buckled in a 1985 earthquake. Following the quake, the World Bank backed a nationwide project to reduce the damage from future quakes. The World Bank has learned the value of mitigating environmental calamities that threaten long-term development.

environmental management and protection were firmly established." Several new loans, now under preparation for Brazil, would protect conservation areas and threatened ecosystems, strengthen environmental and forestry agencies, and support environmental training and research.

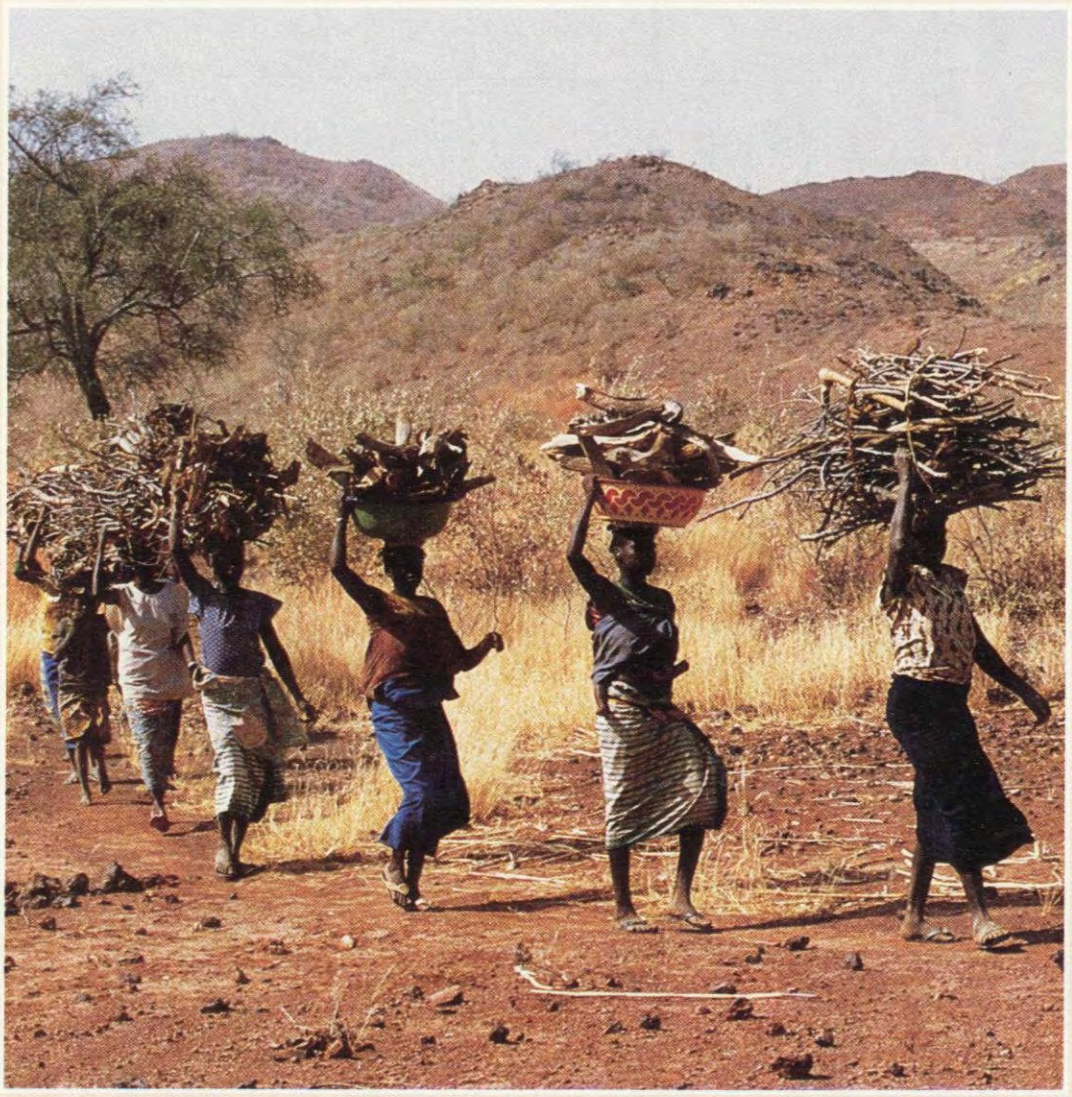
The Bank is working to ensure that the projects it funds will protect the environment long after they are completed.

In particular, the Bank is focusing on improving environmentally sound operation and maintenance of its projects. For instance, in China a $127 million loan will build and equip a pharmaceutical plant with systems to guard against the release of hazardous materials, to monitor waste water and metallic sludge, and to assess overall air and water pollution control.

Spreading Environmental Knowledge throughout the Bank

The Bank has instituted specific measures to learn systematically from experience. Environmental issues are now to be addressed in the appraisal reports by staff (submitted to the Board before approval), as well as in the audits of completed projects. Sector-specific reviews are undertaken: for instance, a survey of the environmental aspects of Bank energy projects. Country-specific reviews are conducted as well. One study, for example, is examining how the Bank has dealt with environmental issues and problems in large development and infrastructure projects in Brazil.

The Bank is codifying the best available environmental practices in a long and growing series of guidelines, covering issues from the protection of tribal peoples to controls on the use of pesticides. These guidelines incorporate lessons learned from the field and culled from knowledgeable sources around the world. The guidelines help promote sound social and environmental management in developing countries. ■



Women carrying firewood in Burkina Faso. These women spend many hours and walk many miles each day to collect fuel for cooking. It is difficult for them to conserve trees when no other source of fuel is available.



Making Choices

Forethought, constant monitoring, and collaboration are essential. But these key ingredients cannot forestall the tough choices that must be made in dealing with environment and development. Concerns about long-term conservation often run up against concerns about meeting developing countries' immediate and frequently dire needs. Woodlots created to serve villages do not fulfill all the functions of natural forests. But they help meet the basic immediate needs for fuel. "If there is no food and people are hungry," says Hassan M. Hassan, a senior environmental specialist working on natural resources evaluation at the World Bank, "you cannot ask them not to hunt and eat gazelle. And if there is no fuel to cook with, you can't ask people not to cut down trees. There has to be development to solve these problems."

Making choices, Bank staff often find, can be difficult, as the search for environmentally sound energy sources illustrates. Countries need energy to develop. Each option comes with costs. Dams for hydroelectric power, as well as irrigation and flood control, often disrupt the lives of people around them, flood valuable land, and may create health hazards through waterborne disease. Coal must be mined, which disrupts the environment, and coal-fired power plants pollute the atmosphere. Similarly, the burning of trees releases carbon dioxide and carbon monoxide into the atmosphere—all of this contributes to global warming.

Forethought, constant monitoring, and collaboration are essential in dealing with environment and development. But tough choices must be made.

Reducing demand for energy is an obvious step towards conservation, but of marginal effect in energy-poor countries. Moreover, putting high prices on energy to curb consumption may trigger inflation and may raise the prices of some of the country's goods, making them less competitive internationally.

Environmental considerations—and difficult trade-offs—cut across every sector of the Bank's work. The following pages show the positive ways in which the Bank is supporting the efforts of developing countries to satisfy the often mutually consistent objectives of economic development and environmental protection.

Agriculture

The environmental destruction of farmland is intensifying. By the year 2000, the world's growing population may require agricultural production 60 percent greater than that of the 1980 harvest. This population growth, combined with stubborn poverty, is forcing farmers and herders in developing countries to move onto marginal and fragile land, such as mountain slopes, forests, and desert margins.

The search continues for means to boost crop yields, as the Green Revolution has done in Asia. But in the developing and developed worlds alike, ways are needed to grow more food without heavy reliance on environmentally costly chemical pesticides, fertilizers, and irrigation water. Protecting and enhancing farm and grazing land—and the water, nutrients, and other environmental systems that make such land productive—is a major task for governments—and the Bank.

Three-quarters of all new World Bank agricultural loans contain environmental components. Loans support proper land management and conservation, improved pest management and pesticide use, better wildlife management and forest protection, improved drainage and irrigation systems.

Environmental training and technical assistance components of Bank projects help developing countries build the capacity to protect their agricultural resources. One such loan to Guinea provides start-up money to establish a national network of seed production and treatment centers. These centers will spread improved strains of rice, maize, and groundnuts (peanuts) nationwide.

The Bank has incorporated agriculture-related environmental protection in some policy-based loans. A policy loan to the Gambia will help that country diversify into fisheries, in part to help reduce environmental pressures on land. It will also help formulate an environmental action plan that will improve natural resource management, so that fisheries and other natural resources are managed on a sustainable basis. The Bank is conducting a study of agricultural pricing policies and their effects in eighteen countries. The study seeks to develop guidelines for policy makers.

Agricultural loans back research. A project in Togo, for example, explored techniques of rotating cotton and food crops to boost yields while protecting soil. The Bank is particularly targeting research to find ways to boost yields, while protecting the environment, in areas of growing and increasingly dense populations. Together with more than forty other donors, the Bank, through the Consultative Group for International Agricultural Research (CGIAR), is also identifying ways to improve livestock and food crops.

One particularly promising technology being pursued by the Bank and being introduced into a number of projects involves a deep-rooted grass called vetiver. Vetiver does not encroach on adjacent crops and can grow under semi-arid, swamp, and rocky conditions. It is resistant to pests, and it is cheap. Grown as a hedge in tropical and semi-tropical areas, this grass can reduce erosion and increase soil moisture, and thus boost crop yields. The Bank has supported the spread of vetiver grass in India, where it originated, as well as to Brazil, China, Indonesia, Madagascar, Myanmar, Nigeria, the Philippines, Sri Lanka, and Thailand.

Bank activities in other areas of agriculture include:





Vetiver grass (top, center) guards against soil erosion in India. A clump of deep-rooted grass (bottom) is held by an Indian researcher. The grass, which is being promoted by the World Bank, offers hopes for better soil and moisture conservation on farms in many parts of the developing world.

Irrigation

The Bank is taking steps to mitigate the adverse impact of irrigation, including salinization, waterlogging, and the depletion of groundwater reserves. A Bank task force is devising methods to prevent future land degradation and finding means to recover farmland that has been waterlogged or suffered salinization.

Irrigation is also targeted in Bank policy lending. An agricultural sector loan to Pakistan supports the rehabilitation of irrigation and drainage systems; the loan will also improve management of surface and groundwater resources and address the issues of waterlogging and salinity.

In an earlier irrigation project in Pakistan, the Bank developed a unique management tool consisting of 2,000 equations, called the Indus Basin Model. The model shows how various government policies, such as water allocations, taxes, or subsidies, will affect farmers' use of water resources. It also assesses how different types of irrigation systems can cause such problems as waterlogging or salinization. The model has been used extensively in planning efficient and environmentally sound irrigation schemes for Pakistan and is being adapted for use in other countries (see the box on deserts and arid lands, page 26).

Pest Management

Excessive reliance on chemical pesticides, often subsidized to the point that users have little incentive to apply them judiciously, has contaminated the environment, damaged the health of both farmers and

Deserts and Arid Lands

Mention the spread of deserts and an image of shifting sand dunes comes to many people's minds. But many of the world's arid and semi-arid regions face a far less dramatic and more insidious problem than blowing sands: the gradual and sometimes unnoticed deterioration of drylands used for farming and grazing.

Drylands maintain a fragile balance between desert and productive land. The parched lands often suffer from a deadly combination of poor land management and high population growth. As supplies of fuelwood dwindle, people stop using animal dung and crop cuttings for fertilizer and begin using them for fuel. As this happens, the land quickly loses fertility. Crop yields fall, and erosion speeds up. Farmers often "mine" land until it is no longer productive—and then move on to new land. In this way, as much as two-fifths of Africa's non-desert land is at risk of being severely degraded, as is a third of non-desert land in Asia and a fifth of non-desert land in Latin America.

The need to control the man-made spread of deserts is especially urgent because the natural process of environmental deterioration of drylands, once triggered, is difficult or impossible to reverse. The World Bank is working with many governments, including those of Burkina Faso, the Gambia, Mali, Senegal, Sudan, Tunisia, and India, to change policies that have encouraged environmental destruction in the drylands and to set up the institutions needed to put the new policies into place. Policy work in Sudan, for instance, has focused on inherited land rights—a thorny family, tribal, and cultural issue. In addition, the Bank is monitoring and adopting technologies designed to curb desertification, for instance the development of vetiver grass (see page 25).

The Bank is also learning from projects started by other organizations. In one project in Burkina Faso, started with the help of Oxfam, a British relief and development agency, water runoff and erosion were controlled successfully after farmers built stone barriers across sloped areas. "In other countries, we are working to develop grazing management systems with local herders associations," said Ridley Nelson, a natural resources specialist in the Bank. "There is a need for a lot of adaptive research and more pilot programs. It's going to be a long, difficult struggle."

By 1991 the Bank will have prepared and appraised about twenty-nine projects with an impact on dryland areas—and provided an estimated $200 million a year on efforts to control the spread of deserts. A Bank task force on dryland management is asking NGOs, governments, and scientific experts for guidance. The Task Force keeps active contacts with international networks, including the Consultative Group for Desertification Control and the Inter-Agency Working Group on Desertification, and undertakes studies of key dryland issues. These include a major review of dryland management methods, an agro-forestry review, and examinations of water harvesting in Sub-Saharan Africa, migration in West Africa, and soil degradation in Nigeria and Mali.



Sandstorm in Mali.
Within minutes of taking this photo in the 120° F (50° C) heat, a World Bank expert on arid lands, Jon Martin Trolldalen, was covered in sand. Controlling the spread of deserts and protecting drylands used for farming and grazing is the aim of about 29 projects to be launched by the Bank by 1991.

consumers, spurred the emergence of resistant strains of pests, and destroyed the natural enemies of pests.

The Bank is incorporating integrated pest management techniques into agricultural and water pollution control projects and is stepping up research. For instance, research on cotton pest control in Sudan and Togo is seeking to rationalize pesticide use and avoid the elimination of beneficial insects. A project in Kenya supports the development of disease- and pest-resistant varieties of plants. A workshop sponsored by the Bank jointly with the International Center for Insect Physiology and Ecology (ICIPE) in Nairobi brought together farmers, agricultural extension workers, researchers, and policymakers from all parts of Africa to distill operational lessons from their experiences with integrated pest management in Africa.

Through the CGIAR, the Bank is investigating natural methods to curb agricultural pests and diseases, including ways to control some major parasitic diseases that strike African cattle. The Bank is working with UNDP support to implement a regional integrated pest management program in North Africa.



Family farmers in Ecuador. Protecting and enhancing farm and grazing land is a major task for developing countries—and the Bank. Three-quarters of all new World Bank agricultural loans have environmental components.

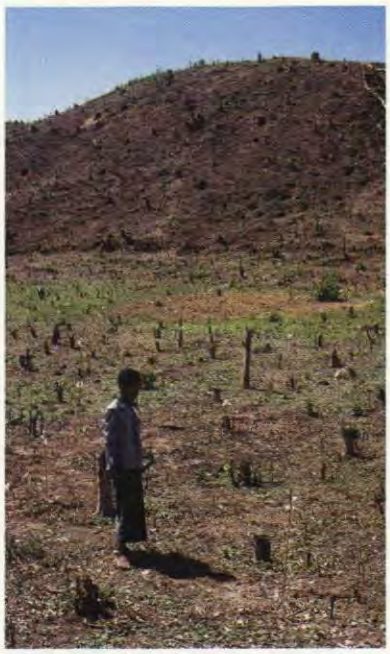
Watershed degradation

In Asia, where 127 million people live and farm on upper watershed areas, the Bank is reviewing the causes of and solutions to watershed deterioration. The study examines social patterns of upland farming that can lead to environmental damage, such as falling agricultural productivity, erosion, and sedimentation of dams, reservoirs, and irrigation systems. The review examines technical solutions to problems and outlines how governments and donors might respond through investment projects and policy reforms. The review is providing guidance in the Bank's dialogue with its borrowers on strategies for resource management.

Livestock

Through support to the CGIAR and national research programs, the Bank is backing the search for high-yield, environmentally beneficial pasture plants. Such plants could help arrest the expansion of pasturelands to meet the growing demand for meat and milk in the developing world.

The Bank is also seeking shifts in government policies, such as subsidies to livestock production, that can worsen the problems of overgrazing, dryland management, and deforestation.



Before...

Forests

Forests are a vital, life-giving asset. They provide food, fuel, and building materials. They harbor an enormous array of plants and animals, many of which yield medicines. Forests protect watersheds and recycle moisture. They reduce concentrations of carbon dioxide in the atmosphere.

But poverty and the struggle to survive have led many developing countries to ask too much of their forests. Seven out of ten people in developing countries depend on fuelwood to meet their cooking and heating needs. Forests are relentlessly cleared to make farms or cattle ranches or to supply commercial timber, without equal attention to regeneration. As forests are burned to clear land, carbon dioxide and carbon monoxide are put into the atmosphere, which contributes to global warming.

The earth's forested areas have declined by about one-half in this century. Each year more than 11 million hectares of additional tropical forests are cut.

As concern over deforestation has mounted worldwide, the World Bank has given more attention to the problem. The Bank's lending for free-standing forestry projects, excluding those for forest industries, totalled $727 million from 1983 to 1987. Plans call for lending to double between 1988 and 1992.

The Bank's emphasis is on helping countries strengthen their abilities to manage their forest resources. Some forestry ministries in developing countries, says Raymond Rowe, the World Bank's forestry adviser, "have only a ruler with which to measure trees, and no vehicles in which to go out and inspect forest resources. In all World Bank forestry projects there is a shift toward building up institutions."

The World Bank has sought to broaden its work with other organizations. In 1985 the Bank, together with the UNDP, the Food and Agriculture Organization (FAO), and the World Resources Institute, published *Tropical Forests: A Call to Action.* The report recommended doubling forestry investments and improving national policies concerning forests. About fifty-two countries are developing their own forestry plans on the basis of the tropical forest action plan presented in the report. The Bank has helped with this planning in Ghana, Kenya, Papua New Guinea, Sudan, and Tanzania.

Also, the Bank is cooperating with NGOs in its forestry activities. A project in Sri Lanka, approved in June 1989, will help manage timber production on a more sustainable basis and will protect the country's tropical

forests. In planning the project, the Bank sought advice from the International Union for the Conservation of Nature and Natural Resources (IUCN) on how best to protect diverse animal and plant life in the project area.

The Bank recognizes that many of the solutions to deforestation must come from outside the forestry sector. Poor people clear forests for farming when they lack other economic opportunities. Villagers cut trees if they do not have access to cheap alternative fuels. "We have a duty to understand the fundamental forces at work," says Jeremy Warford, senior adviser, economics, in the Bank's Environment Department. "We have to understand why people cut down the forest and then find incentives for them to protect the environment."

One cause of deforestation is adverse national policies on land tenure, farm subsidies and fuelwood prices. The elimination of subsidies for cattle ranching in tropical forests, for example, can be of substantial help in checking the rate of tropical deforestation. The Bank and some of its borrowers in Latin America and West Africa are discussing the possibilities for future loans that will finance changes in such policies.

Forestry components are included in many types of projects, particularly those for agriculture and energy. Free-standing social forestry projects, which produce fuelwood, fodder, and building materials, seek to incorporate forests into the daily lives of communities. A project in Uganda provides incentives for the sustainable use of forests through technical assistance and the planting of seedlings. The original goal of a highly successful social forestry project in the Indian state of Uttar Pradesh was to plant 8 million trees. At its end, 354 million had been planted. More important, the community is dedicated to preserving these resources.

Most forestry projects emphasize conservation through replanting and the planned use of forest resources. A project in Ghana is one example. Forests cover half the country and employ about 70,000 people, and timber is the third largest export. The project, which assists the forestry industry, will provide fuelwood for local use and timber for domestic and export markets.

Bank projects to conserve forest ecosystems are under way in Brazil, Indonesia, Madagascar, Mexico, Portugal, Tunisia, and Uganda, and one is planned for Côte d'Ivoire. The project in Indonesia will help protect five national parks that provide habitat for unique species of animals, such as the clouded leopard and the Sumatran rhinoceros. Protected tree species will serve as an important gene pool for breeding. In Brazil the Minas Gerais forestry project funds the largest ecological research program in the state's history and benefits about 20,000 small- and medium-scale farmers by establishing plantations to take pressure off natural forests.



...And after.
In one year, seedlings planted next to stumps (opposite page) flourished into young trees in a Bank-backed forestry project in Bangladesh.

Biological Diversity

The profusion of plant and animal species that inspired Darwin cannot be taken for granted. Millions of species may disappear if extinction proceeds at the present all too rapid rate, particularly in the developing world. The World Resources Institute has estimated that one hundred species will be lost a day over the next twenty-five years.

Such a die-off may have serious and as yet unknown consequences for the future of humanity. The natural lands and waterways that are home to most species are storehouses of medicines and other useful materials. In addition, well-functioning ecosystems prevent floods and droughts, control soil erosion, recycle wastes, filter pollutants, and regulate climate.

Most of the remaining pristine ecosystems, which harbor the widest array of flora and fauna, are found in the developing world. Much of that rich natural stock is threatened—by rapid population growth, poorly planned economic development, and changes in technology, which make possible large-scale alterations of the environment.

The Bank is devoting more attention to this critical issue. The centerpiece of this work consists of actions to protect wildlands—the forests and prairies, deserts and shrublands, marshes and coral reefs, and other natural areas relatively untouched by human activities. Wildland management is the least costly and, in many cases, the only means available for maintaining biological diversity.

The Bank's approach to wildlands conservation has grown in scope and complexity. Its wildlands policy, adopted in 1986, helps conserve biological diversity by preventing, minimizing, or compensating for any change in wildlands that may accompany Bank-backed actions. The new environment assessment guidelines will ensure that biodiversity is routinely addressed when developing projects.

Between 1973 and 1989 the Bank funded more than seventy-five projects containing measures to protect wildlands. These included measures to set up or strengthen national parks, wildlife sanctuaries, biological stations, and reserves in more than twenty countries. The elephants of Sri Lanka, the ostriches of Sudan, and at least seventeen other rare or endangered species were helped through Bank-supported projects. One project in Bolivia protected the vicuña, a relative of the llama, by strengthening antipoaching measures; the project also promoted the raising of alpacas and llamas, whose wool boosts the incomes of poor farmers and artisans.

Forethought is essential in preserving biodiversity. For instance, in Costa Rica a Bank project to develop the nation's highways was accom-

panied by measures to prevent the clearing of forested areas. In Kenya the IFC helped relocate a textile mill to avoid polluting Lake Nakuru, home to thousands of pink flamingos and other waterbirds.

In refining its approach toward protecting biodiversity, the Bank recognizes the need to offer tangible benefits to people who live in and near protected wildlands. The idea of enlisting the support of local people in wildlands management is not new. In a 1976 loan to Kenya, the Bank helped launch a nationwide system of wildlife clubs to build support for wildlife protection. The Bank's current task force on biodiversity has launched research on economic incentives to involve local people in wildlands protection. This aims to achieve ways of striking the delicate balance between promoting social and economic development and safeguarding the environment.

The Bank also supports a *global* biodiversity strategy being developed by the World Resources Institute, the IUCN, the Worldwide Fund for Nature, and the UNEP. *National* biodiversity strategies are evolving from country-level conservation strategies prepared by IUCN or from the Bank's own action plans. The Bank funds projects devoted solely to protecting biodiversity, such as the forestry-environment projects under preparation in several African and Asian countries. Bank funds are used to train and equip wildlands and wildlife specialists such as park rangers, to demarcate reserve boundaries, to establish public information centers, and to develop plans for the management of parks and surrounding areas.

To better review the ecology of potential development sites, the Bank is strengthening its own expertise. Increasingly, the Bank is using outside experts—for example, the IUCN and the World Wildlife Fund, which assembled critical information and ideas that helped shape Bank-backed strategies in countries like Indonesia and Madagascar. Special studies have been prepared by the International Council for Bird Preservation and the World Conservation Monitoring Center to support conservation of habitat, including wetlands, in the Mediterranean.

Improvement of biodiversity management techniques is one area being emphasized in the Bank's research. Another is the development of better knowledge of the location of ecosystems and the economic reasons for protecting them. Studies under way include a review of the Bank's experience in dryland management, a review of Bank operations in watershed management in Asia, and an ongoing study in Africa that is providing guidance for integrating conservation of biodiversity with wildlife-related economic development opportunities for local communities. Bank guidelines for the preservation of marine biodiversity are in an early stage of preparation.



Precious extract. A young Malagasy holds a periwinkle, which provides an ingredient for a drug used to treat childhood leukemia. The flowers are gathered for export to drug companies. Tropical forests throughout the developing world are storehouses of medicines and other useful materials. Bank projects have begun to protect this biodiversity.



Conserving firewood in Burundi with a cookstove developed and introduced by the World Bank.

Energy

The developing world, like the industrial world, must have access to energy to meet people's daily needs and to support modern manufacturing enterprises. Developing countries, which hold three-quarters of the world's population, use only one-quarter of its energy. But just as energy development can be an ally of progress, so too can it be an enemy of the environment, causing pollution and promoting deforestation.

The thrust of the World Bank's energy work is increasingly to promote development in the energy sectors of developing countries while taking prudent steps to mitigate damage to the environment. More than half of all energy projects approved today contain environmental elements.

Projects are more often than in the past intended to conserve energy and create regenerative energy sources. In Mozambique, where the burning of fuelwood accounts for 80 percent of all household energy and has led to deforestation and air pollution, a project initiated by the Bank will develop other sources of energy, connect more houses to the electric power system, and market new home cooking devices. The project will benefit one-quarter of the poorest people in urban areas, who spend up to half of their income on fuel.

Environmental components within Bank energy loans include steps not only to mitigate unsound environmental practices but also to minimize hardships for people who must move or give up land to make way for energy development. In the Central African Republic, for instance, where the Bank is financing a dam to provide desperately needed power, the government is compensating villagers who have to be resettled. Bank funds will be used to replace forests lost through flooding and to clear debris from flooded areas, which will promote the development of fisheries and ensure clean water for drinking.

The Bank is encouraging more efficient use of available energy. One measure that helps is to charge proper utility fees. Virtually all power projects contain loan conditions aimed at improving pricing policies, with a view to controlling demand and increasing efficiency.

An energy options study in Brazil is examining non-Bank-assisted pig iron smelting in the Greater Carajas region of Amazonia, where use of charcoal as an industrial energy source has led to wide deforestation. The study looks at the economic costs of alternative energy sources consistent with an overall energy strategy aimed at efficient resource use.

Some projects are directed primarily at energy conservation. A loan to Bangladesh will finance measures, such as repair of worn-out and

inefficient equipment, to conserve energy in industries and power plants around the country. The project is expected to cut the annual consumption of industrial energy by 7 percent and to slash consumption for some individual firms by as much as 30 percent.

A project in Malawi supports the manufacture and marketing of more efficient charcoal kilns and cooking stoves to reduce energy demand. Fuel-efficient techniques for curing tobacco—one of the country's main exports—are also being spread. The project will lead to more realistic pricing for wood and to better protection of national forests.

The Bank is also directing research at the development of alternative energy sources. A handbook on windpumps will aid government decision-makers. Other research projects examine ways of deriving energy from municipal waste and substituting kerosene and gas for fuelwood.

The Bank is increasingly helping developing countries better manage their energy sectors overall. In addition to helping create environmentally sensitive national energy policies, such as those dealing with pricing, sector loans are used to strengthen energy institutions. With Bank financing, Brazil has placed more than one hundred environmental specialists in its regional electrical utilities, and the number is growing. Previously no environmental staff served in these utilities. A manual of environmental procedures for the power sector and an environmental master plan have also been drafted. Sector loans with similar environmental goals are under way in other countries.

Furthermore, courses offered by the Bank's Economic Development Institute assist developing countries to integrate energy and environmental considerations into their overall development planning.

The Energy Sector Management Assistance Program

ESMAP, which is supported by the Bank, the UNDP, and other UN and bilateral aid agencies, is of great importance for the environmentally sound development of energy sources. ESMAP identifies and analyzes the most serious energy problems in developing countries and proposes investments to address them. Its studies examine all kinds of energy—fuelwood and crop residue, oil, gas, and electric power, and renewable sources such as solar and wind power. These studies, which have been conducted in more than fifty countries, provide valuable institutional and policy advice to decisionmakers. They also advance measures for conserving energy by reducing demand and improving efficiency in both the generation and the use of power.

An ESMAP energy assessment alerted the Mauritanian government to the dangerous depletion of its fuelwood. A project was subsequently

launched in the fall of 1986 with funding from the United Nations Sudano-Sahelian Office and the United Nations Development Fund for Women to encourage the use of charcoal-efficient stoves and fuels other than wood. This work has been followed up with further ESMAP studies, culminating in a household energy strategy. The World Bank is expected to finance part of the forestry-related proposals made in the study.

ESMAP activities in 1989 included industrial energy conservation in Ecuador, identification of promising sites for large-scale windfarm development in India, improved charcoal kiln production and distribution in Burundi, and improved cooking efficiency in Ethiopia.

Global warming

Global warming is an environmental problem of concern to all countries. Increased combustion of carbon-based fuels is contributing to the worldwide buildup of carbon dioxide and other gases. These emissions accumulate in the atmosphere and trap heat through the so-called greenhouse effect. If worldwide temperatures climb, says Bank science adviser Erik Arrhenius—the grandson of the Swedish physical chemist who originated the theory of the greenhouse effect—"the global mean sea level may rise, threatening coastal structures and the salinity of fresh water supplies. The probability of extreme events such as violent storms, monsoons, droughts, floods, et cetera, is likely to increase."

The Bank cannot ignore the potential dangers of global warming. Although developing countries contribute a far smaller per capita share of "greenhouse" gases than industrialized nations, most of the future increase in such emissions is likely to come from those countries. In 1989 the Bank undertook a review of precisely what is and is not known about global warming and the implications for Bank operations. As a result of the review the Bank has begun to work for increased efficiency in all energy lending operations and to put more emphasis on natural gas, which releases much lower emissions than other practical fuels. The Bank is also assessing the feasibility and economic viability of energy systems that are not carbon-intensive, such as minihydroelectric structures suitable for regions rich in streams, hills, and mountains, as well as wind power and photovoltaics.

Pollution

To the Biblical list of the four great plagues of mankind—war, famine, pestilence, and death—the modern age has added a fifth scourge: environmental pollution.

Pollution, although traditionally associated with wealthy nations, is a great and growing concern in the developing world. Air and noise pollution are major problems in burgeoning urban centers like Ankara, Bangkok, Cairo, Calcutta, Jakarta, Lagos, Manila, Mexico City, and São Paulo. As demonstrated by the Bhopal chemical disaster in India, industrial catastrophies will become an ever greater worry as developing countries develop their manufacturing sectors. One aspect of environmental pollution—unsanitary living conditions caused by inadequate water supply and waste disposal—is found almost exclusively in poorer countries. Throughout the developing world, water polluted by municipal and industrial wastes causes disease and death (see the box on health, page 36).

The World Bank's programs to counter pollution were among its earliest dealing with the environment. They have remained important components of work in energy and industry and in urban and transportation projects, and they have extended into policy-based lending. For instance, a recent structural adjustment credit to Ghana called for the preparation of a

Smog blanketed Sarajevo, Yugoslavia in the 1970s. The Bank launched its first comprehensive urban environment control project there to tackle air and water pollution. In addition to helping the city switch from coal to cleaner-burning natural gas, the Bank helped finance improved water systems and sewage collection.



comprehensive environmental action plan, including provisions to control mining and industrial pollution. The Bank is developing projects in tourist areas along the Turkish and Yugoslav coast to protect existing water sources from pollution and provide for environmentally sound sewage disposal.

Urban pollution

The Bank's work to help governments control urban pollution is expanding. It embraces projects such as a loan to help Chinese utilities

Health

Clean water, air, food, and living conditions are the rewards of sound environmental management. The Bank has supported many projects to address environmental health. A program to improve Indonesia's irrigation system supports the development of control measures for malaria and other water-related diseases. In addition, World Bank projects and policies directly target environmental improvements in health and safety.

La Paz, Bolivia

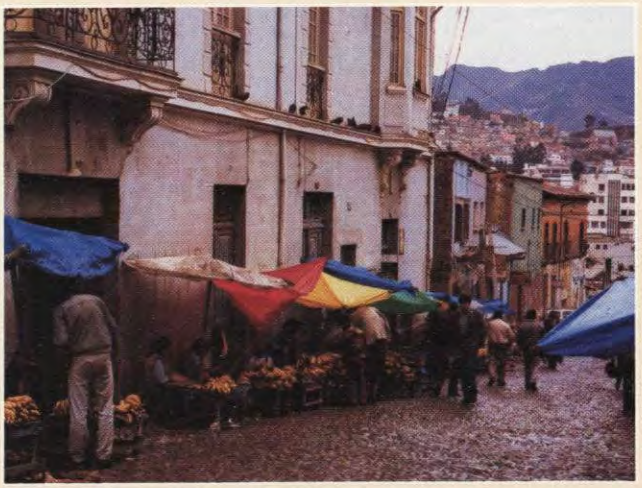
The Bank will support measures to clean city streets, improve garbage collection and disposal, and control settlement and deforestation, especially on steep slopes around the Bolivian capital. Flood and erosion control will help prevent landslides, and an early warning system and emergency procedures will be established to speed aid to landslide victims.

Karachi, Pakistan

The Bank will help upgrade the city's drinking water system, improve the organization and management of the Karachi Water and Sewerage Board, and build three new sewage treatment plants to reduce water pollution by this coastal city.

Northeast Brazil

The Bank will back a five-year program to curb waterborne diseases, particularly among school-age children and agricultural workers. Training and surveillance programs will emphasize the safe handling of pesticides.



Help for La Paz. In Bolivia's capital, the Bank will back steps to clean city streets, improve sanitation, and control settlement, especially on the landslide-prone slopes that surround the city.

The Bank supplements its operational work with research, such as a joint study with the World Health Organization (WHO). This study, to be carried out in cities on three continents, identifies the links between development and air pollution and will help improve the design of energy, industrial, and transport projects. The Bank is also collaborating with WHO on case studies in Brazil and Indonesia to examine links between development policies and health.

improve water quality and waste treatment. Another example is a proposed Punjab urban environmental protection project in Pakistan. Experience with a previous project revealed the need for a program that would address air, water, and noise pollution, solid waste management, and environmental training needs.

The Bank is also embarking on regional initiatives, such as the Capital Cities project to help clean up major cities and waterways in Asian urban areas. In this program the Bank, with UNDP support, is assisting Asian countries strengthen their institutional capacity to regulate and enforce pollution control. The hope is that well-publicized clean-up activities will serve as models for similar activities throughout the developing world.

Industrial pollution

The Bank has created a multidisciplinary, multisectoral research task force to look at the risks of industrial disasters and ways of minimizing these risks. In addition, a number of specific projects combat industrial pollution. A loan to India, for example, will tighten the state-run steel industry's controls on air, water, and noise pollution. The project will survey plants to identify the equipment needed for monitoring and controlling pollution.

The IFC, which promotes equity investments in developing countries, is associated with an ambitious effort to control industrial pollution in Gabon. Shell International, on behalf of its subsidiary Shell Gabon, undertook an environmental impact assessment that led to an environmental management plan developed with the government of Gabon. The plan protects an area of dense rainforest and swamp and ensures the proper management of a nearby national park. The IFC reviewed the environmental assessment and the management plan and will closely monitor its implementation. It also reviewed related contingency plans for oil spills and waste management.

Many problems of industrial pollution can be traced to inefficient, out-of-date technology and equipment and poor operation of industrial facilities. The Bank is giving greater attention in its loans to low-waste technologies and environmentally sound project design, as well as to environmental training for operators.

Wastewater and wastes

The Bank is searching for ways to stretch water supplies. Together with the Food and Agricultural Organization (FAO) and the World Health Organization (WHO), it is surveying methods of wastewater reuse and waste management in the Middle East and the Mediterranean. The Bank

is also identifying assistance strategies that could be undertaken by international organizations.

The Bank has traditionally funded sewage control projects. One such project, in Ankara, the capital of Turkey, will bring sewerage services to more than 1 million people for the first time. The project will support a sewage collection system, a sewage treatment plant, and rehabilitation of the existing sewerage network.

Port-related pollution

The Bank is helping to control pollution and minimize the effects of dredging in ports. A project to modernize the port of Karachi, Pakistan, will prevent or combat oil spills in an area of mangroves and mudflats, which are vital for supporting marine life and protecting water supplies. The Bank has prepared a study in cooperation with the International Maritime Organization on environmentally safe port and harbor development.

Toxic and hazardous wastes

Some developing countries have faced the threat of becoming a repository for industrial nations' dangerous wastes. President Conable has underscored the Bank's opposition to sending toxic wastes to developing countries and to ocean dumping. He has pledged the Bank's support to help supply developing countries with the technology for handling their own dangerous wastes. The need to develop cost-efficient programs for hazardous waste management is especially urgent for newly industrializing countries, where toxic wastes are accumulating as manufacturing accelerates. These actions will underlie the new UNEP-led agreement on controlling trade in toxic wastes.

In conjunction with WHO and the UNEP, the Bank has prepared a manual on planning and implementing programs for hazardous waste management. The manual presents techniques and options for waste treatment, recycling, and safe disposal and discusses economic and institutional issues.

Damage to the ozone layer

Chlorofluorocarbons (CFCs) are used as propellants or coolants in thousands of products, from spray cans to refrigerators. These CFCs accumulate in the upper reaches of the atmosphere and damage the ozone layer that screens plants, animals, and mankind from harmful ultraviolet radiation. The Bank has declined to finance a factory making CFCs. To help developing countries move quickly to eliminate CFCs once substitutes are available, the Bank will aid industries in these countries in retooling their factories. "If industry has to re-equip, we believe the Bank should be there to help," President Conable has emphasized.

Population

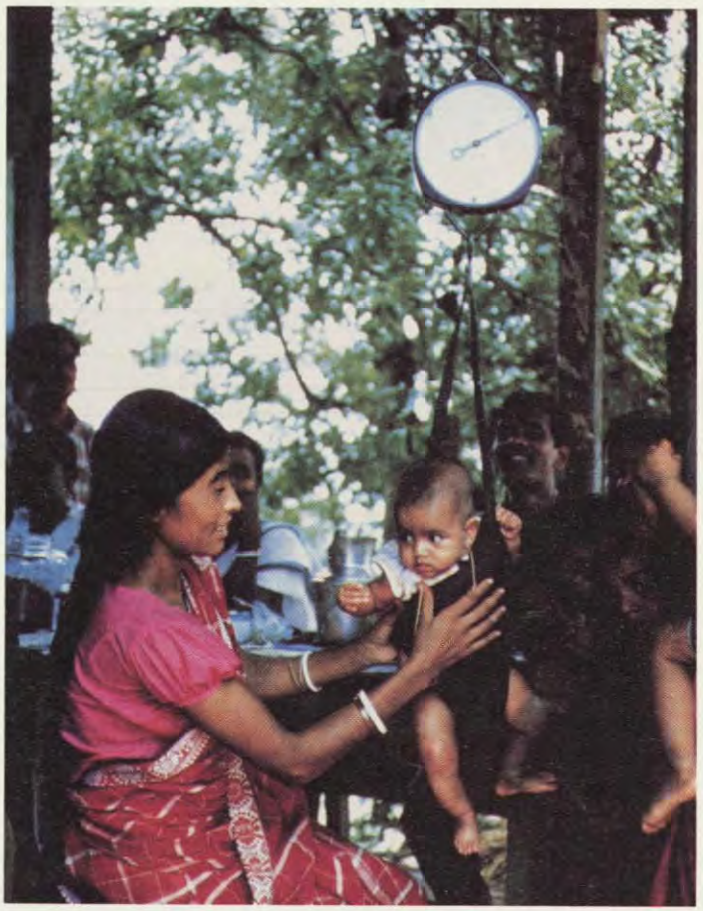
More than 5 billion people now inhabit the earth. Another billion people—the combined total of present-day populations in Africa and Latin America—will probably be added before the end of the century. Ninety-five percent of these people will be born in developing countries. Sub-Saharan Africa's population—which is growing at the highest rate in the world—is expected to double in only twenty-three years.

No single factor contributes more to environmental deterioration in developing countries than rapid population growth. High rates of population growth can dilute or negate modest gains in national economic growth. Just to survive, burgeoning populations place ever larger burdens on water, farmland, forests, and coastal habitats. As those natural resources deteriorate, "environmental refugees" flee to urban areas, where sanitation and other basic services are overloaded.

The Bank has been involved in population programs for twenty years. Because of the political, religious, and cultural sensitivity of the subjects, simply getting a government to discuss population issues is often an important first step toward promoting a population policy. The Bank's population activities, therefore, have a dual emphasis: increasing governments' commitment to the development of a population policy, while helping to finance programs that support fertility regulation. The Bank has learned that governments must "own" these programs. They cannot be imposed from outside.

The Bank plays a significant role in influencing government attitudes through its ongoing, often high-level dialogues with member countries. Discussions with the president of Malawi contributed to the country's acceptance of a policy that encourages spacing births at wider intervals to control population growth. Following meetings of senior Bank staff with the president of Senegal, the Bank was invited to advise the country on ways to help reverse its upward trend in population growth.

The Economic Development Institute has organized senior policy seminars to foster dialogue on population policy in developing countries.



Weighing a baby at a health center in Bangladesh. Good family health and nutrition is a vital part of the World Bank's population programs.

These seminars increase awareness of the relationship between population growth and economic development. More than ninety policy-level government officials from thirty-five African countries have attended such seminars.

Since 1970 the Bank has funded about sixty projects devoted to family planning or dealing in part with population issues. In the past five years the Bank has lent more than half a billion dollars for population projects. Lending is expected to increase to some $800 million in the three fiscal years 1990 to 1992. The Bank's population lending has spread from one African country in 1982 to nearly twenty today. Improved delivery of family planning services lies at the heart of the Bank's population project strategy.

The Bank carries out research to improve understanding of the links between development and population growth. Areas of prime interest include study of the most effective family planning delivery systems, the private sector's role in contraceptive distribution, and incentives to encourage smaller family size. The Bank has completed more than ninety sector and economic reports related to population, health, and nutrition. Such sector work has helped countries such as Indonesia develop population programs.

The Bank collaborates with other organizations to cofinance projects and conduct joint research. For example, since 1985 the Bank has worked through the International Planned Parenthood Federation to strengthen the management capabilities of local African family planning associations and to encourage cooperation between governments and NGOs. Individual projects in Bangladesh, the Gambia, Kenya, Sri Lanka, and Zimbabwe support local NGO initiatives to provide family planning services.

Such population activities are essential to global efforts to safeguard the environment. When sustainable development is the objective, World Bank President Barber Conable has said, "then the prerequisite is to bring human populations into balance with the natural resources that support them."

Cultural Property

A venerable Brazilian church, the ancient walls that once guarded a historic Pakistan city, and buried neolithic sites in East Africa may seem to have little to do with economic development. Yet they do. Cultural legacies sometimes offer monetary rewards by attracting tourists. Sometimes they offer lessons in development. But always they help define people's sense of themselves and where they are headed, adding meaning and beauty to their lives.

Recognizing this, in late 1986 the World Bank adopted official guidelines on managing cultural property. The Bank is now committed to preserving sites with archaeological, paleontological, historical, religious, and unique natural significance. The Bank generally declines to finance projects that will significantly damage cultural property.

Protecting a legacy. In Cyprus, an engineer and economist noted that a planned road project would pass near the former Roman trading port of Paphos, noted for its mosaics (below). A World Bank architectural historian, working with other experts, began investigations that are expected to lead to improved conservation of the site.



Bridging the Past and Future

When World Bank staff visited Visegrad, Yugoslavia, to appraise a hydroelectric project, they discovered that the proposed dam construction would destroy a vital piece of the country's heritage—the Mehmed-Pasha Sokolović bridge.

The 108-meter stone bridge has spanned the Drina River for four centuries. Kodja Mimar Sinan, often called the Turkish Michelangelo, designed the elegant structure with its eleven graceful arches. Writer Ivo Andrić made it the centerpiece of his monumental saga *The Bridge on the Drina.* The book, which won the Nobel prize for Andrić in 1961, helped create a sense of Yugoslav identity. "The story of the foundation and destiny of the bridge," Andrić wrote, "is at the same time the story of the life of the town and of its people, from generation to generation."

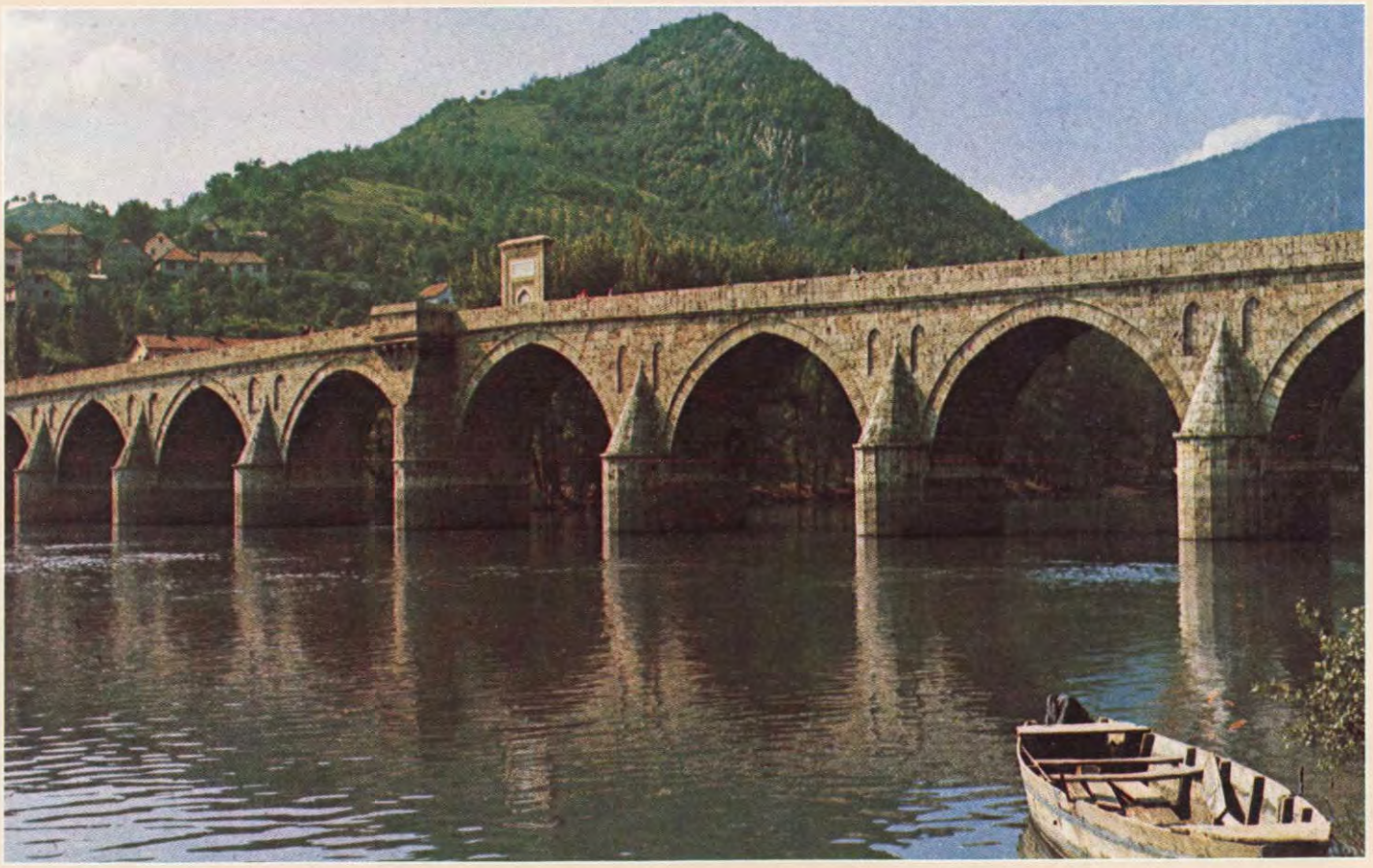
Much as they revered the Sokolović bridge, Yugoslav planners had reconciled themselves to losing it in order to create the hydroelectric plant. Unfortunately, the bridge is built on the narrowest place on the river, the cheapest for the dam.

Recognizing the importance of the bridge, Bank staff asked if another suitable site existed. The Yugoslavs identified a spot 2.1 kilometers upstream.

The dam was built at the upstream site. The Bank then helped restore and protect the ancient bridge, which is now restricted to pedestrian traffic. The dam was designed to serve as the roadway across the Drina.

As a result, the townspeople can sit today at the bridge, as Andrić found them, "head in hands, leaning on the well-cut smooth stone, watching the eternal play of light on the mountains and the clouds in the sky, and...unravel the threads of... small-town destinies, eternally the same yet eternally tangled in some new manner."

Preserving national identity. The Mehmed-Pasha Sokolović bridge (below) is a vital piece of Yugoslavia's heritage. The World Bank relocated a proposed Bank-backed dam to save the bridge, and helped to restore and protect the ancient structure.



The guidelines prohibit undertaking dam construction or other development projects until safeguards are established to ensure that cultural property will not be damaged in the process (see the box on the bridge over the Drina, page 42). Furthermore, the Bank works in culturally sensitive sites only with professional assistance.

The Bank has used a loan for improving urban services to save a sixteenth-century church in Recife, Brazil; devoted part of an urban renewal loan to renovating and strengthening the city walls of Lahore, Pakistan; and, during a preliminary survey for a dam project, identified buried sites of great importance for the study of Kenyan prehistory.

Threats to cultural property are often discovered only after a project has begun. During implementation of the Marib-Safir road project in the Yemen Arab Republic, the Bank developed a conservation strategy to protect the ruins of one of the world's earliest dam sites and irrigation networks, once part of the empire of the Queen of Sheba.

The Bank has dealt with cultural property in more than forty different projects in thirty countries. Bank involvement often occurs in serendipitous ways.

June Taboroff, a World Bank architectural historian, points to a project in Cyprus as a good example. An engineer and an economist working on a planned road project noticed that the thoroughfare would pass near Paphos, a former Roman trading port noted for extraordinary mosaic floors. The road, they realized, might promote additional national and international tourism in the area. That might bring more revenue to the country, but might also damage the artistic legacy and the ecologically fragile land around it.

Alerted to this, Taboroff and a multidisciplinary team that included a leading Cypriot archaeologist, a German landscape architect, an Austrian light-weight structures architect, and a conservation scientist provided by the Getty Conservation Institute in Los Angeles, began investigations that are expected to lead to improved conservation and preservation of the site.

Sometimes saving the past provides direct lessons for the future. Extensive excavations for the massive Mahaweli Ganga development project in Sri Lanka uncovered remains of ancient settlements. Among these remains designers found clues on where best to situate new water tanks and irrigation canals. ■



**Three generations of Turks.
For families and individuals throughout the developing world, the World Bank aims to create a lasting legacy: knowledge and managerial skills that can support long-term environmental protection.**



The Lasting Legacy

Projects, policy dialogue, and research are essential aspects of the World Bank's work. But the ultimate goal transcends these individual undertakings. That goal is to create a lasting legacy: knowledge and managerial skills in developing countries that can support long-term environmental protection.

Whether helping Indonesians plan strategies for the use of their forests or assisting Kenyans in establishing wildlife clubs, the Bank can foster durable institutions able to devise national environmental solutions. "The Bank may come and go, but the institutions and policies [that the Bank has backed] usually take root and persist long after the Bank's loans have been disbursed," says Robert Goodland, chief of the Bank's Environment Division for Latin America.

The emphasis on creating a lasting legacy of environmental concern is seen in the Bank's desire *to involve more people* in the process of thinking through environmental objectives. Efforts are being made to work with a broader range of ministries in developing countries and with local and international NGOs. To this end, the Bank has assembled special external environmental review panels. These are made up of high-level experienced professionals who meet a few times a year, inspect a project, and provide borrowers with independent assessments of progress. This approach has been used in Argentina, Brazil, Indonesia, India, Mexico, and Thailand, among other countries. Lately, the Bank has sought to extend such alliances to include NGOs, which can help involve local citizens.

Environmental *training* is critical to the Bank's goal of strengthening developing countries' own environmental capabilities. Bank training has three aims:

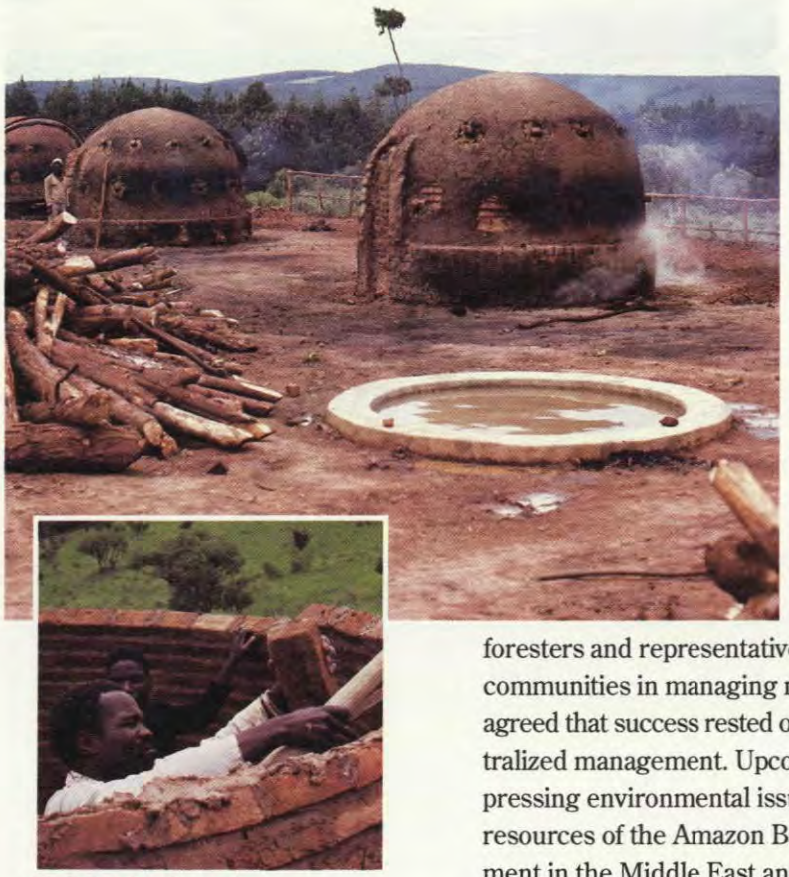
- To broaden policymakers' and managers' understanding of the importance of conserving and managing natural resources
- To acquaint them with the analytical tools needed to incorporate environmental factors into the projects, programs, and policies they design for their countries

"The Bank may come and go, but the institutions and policies [that the Bank has backed] usually take root and persist long after the Bank's loans have been disbursed."

Robert Goodland
World Bank
Chief, Latin American
Environment Division

- To arm environmental specialists with environmental and managerial techniques and strategies that they can pass on to others.

The Bank incorporates environmental training in individual programs. Regions sometimes organize special seminars, such as one series for African policymakers and agriculturalists on integrated pest management.



Training local people. Artisans in Malawi are trained to build energy-saving kilns as part of a Bank-financed project. The kilns produce charcoal from waste wood, such as forest thinnings, far more efficiently than kilns traditionally used in Malawi. The artisans will use the skills they learn here long after this project is completed.

The Bank's main direct contribution to training for middle- and high-level officials in developing countries is provided by its Economic Development Institute, headquartered in Washington. The institute operates in association with regional and national training agencies throughout the world.

The institute has integrated environmental issues into basic courses, such as macroeconomics, which now emphasizes conservation of natural resources and energy. Special seminars and roundtables around the world bring together environmental specialists, development practitioners, and policymakers to share their experiences, problems, and solutions in coping with environmental issues. For example, in a seminar in Zimbabwe senior foresters and representatives from NGOs examined ways of involving local communities in managing natural resources. Among other points, they agreed that success rested on actively involving women and on using decentralized management. Upcoming field seminars will focus on especially pressing environmental issues such as management of the natural resources of the Amazon Basin, water shortages and drylands management in the Middle East and North Africa, and urban and industrial pollution of rivers in Asia. A worldwide roundtable will examine energy and environmental issues.

The Bank is also serving as a *clearinghouse* for environmental information that is critically needed by developing countries to guide and improve their environmental programs. One effort underway at the Bank's headquarters uses satellite photos and other remote sensing technologies to predict and monitor environmental stress. This can help countries to identify areas suitable for farming and to forecast harvest sizes.

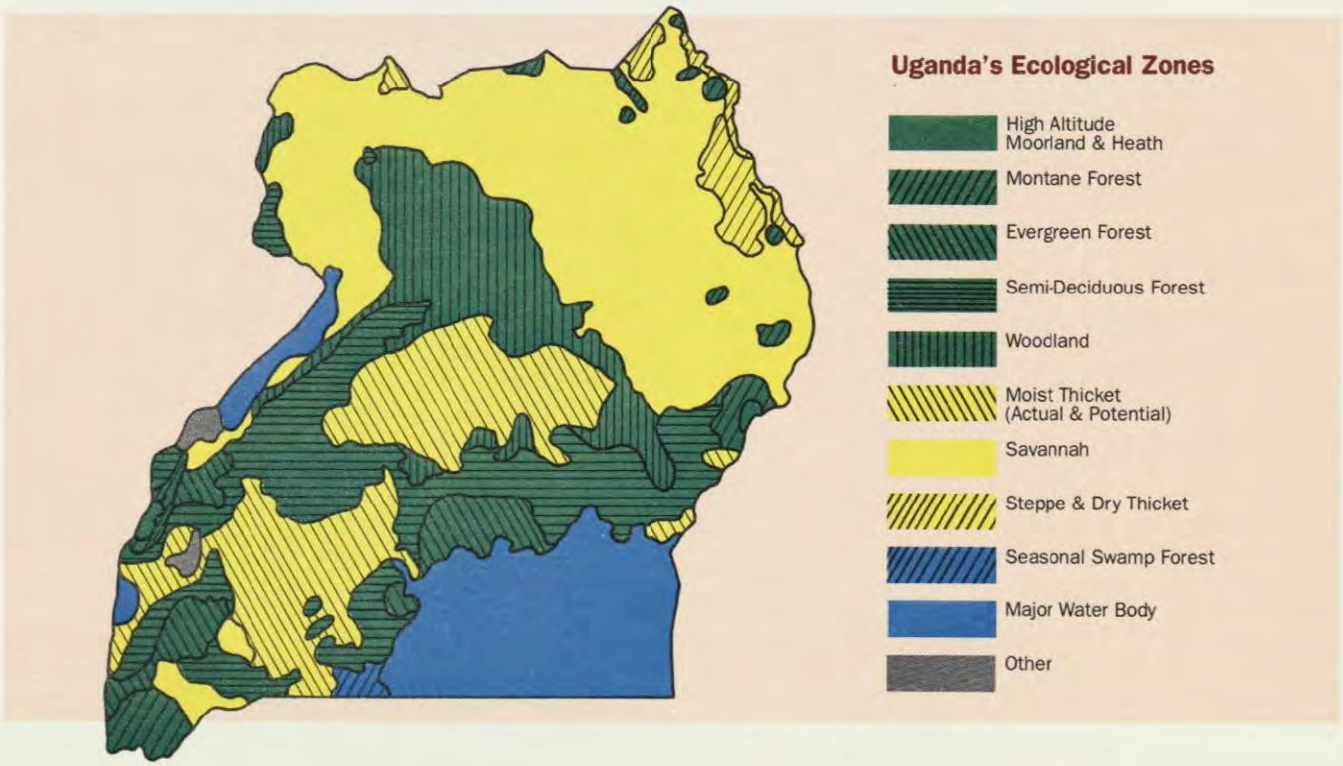
The Bank is compiling an in-house electronic data base to monitor and track Bank environmental projects, create country-by-country sources of environmental information, and provide rapid access to environmental and economic studies.

Bank research identifies techniques that developing countries can apply to improve environmental management and governance.

One especially important subject of recent Bank publications is the need to improve environmental and economic decisionmaking in developing and industrial countries alike. The standard tool used in economic analyses—gross national product (GNP)—has severe limitations. Polluted air causes illnesses and losses in productivity. Poorly planned farming causes erosion and flooding. But GNP calculations do not realistically take account of such degradation of the natural resource base. Also sales of nonrenewable resources are treated as income rather than as a loss of capital. As the heads of the World Bank and the UNEP conclude in a joint study on environmental accounting, "Better tools are needed to measure the progress and prosperity of mankind."

"What we are aiming at," Moeen A. Qureshi, Senior Vice President for Operations, has said, "is much broader than environmentally sound projects per se. Our key objective is to promote the policy and institutional changes that will make sustainable development a reality." ■

Diagnosing environmental problems. The World Bank is devising maps, like this one of Uganda, to help developing countries identify environmental pressures and strengthen their environmental programs. This map was generated by computer using satellite information and data supplied by the United Nations Environment Programme.





The old and the new cross on a river in Bangladesh.



The Challenge Ahead

The world of 150 years ago, when Darwin surveyed tropical cornucopias, has changed. Worries about scarcity have replaced visions of plenty. But the insights Darwin drew from nature's complex interrelationships survive. Moreover, his explorations point to the constant challenge of shaping thoughts to fit new information and changing conditions.

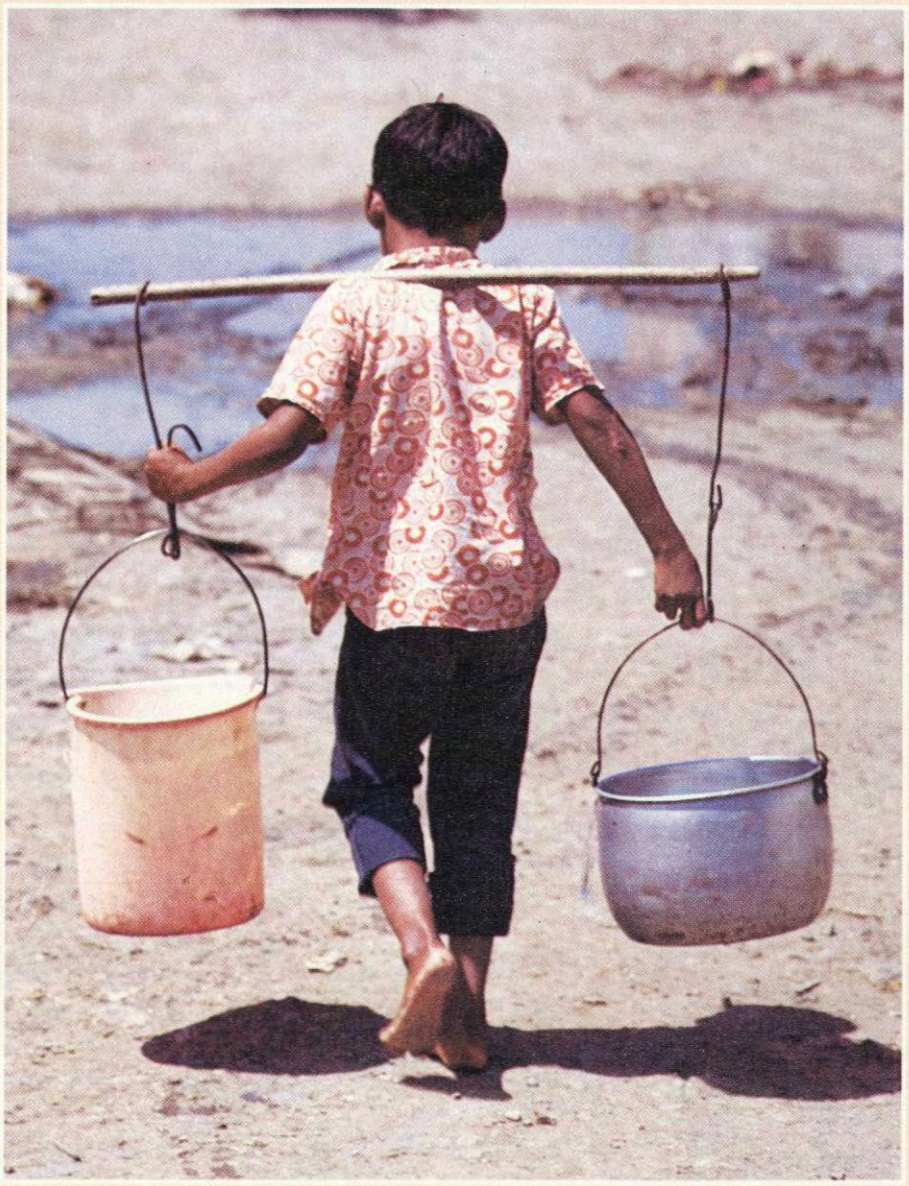
Scientific discoveries, revealing patterns of global warming and showing the latent value of tropical plants, contribute to growing evidence of interdependence not only between people and their environment but also among nations. New evidence, coming almost daily, demonstrates to all that environmental problems know no borders—all nations must be involved.

Industrial countries bear the largest share of the burden and the responsibility. These countries account for 6 percent of the planet's people and about 75 percent of global warming. They must curb their own practices that destroy the atmosphere and other resources. With their financial resources they must help protect precious natural endowments in the developing world.

The World Bank's work with over 150 member countries symbolizes the shared, complex responsibilities that have emerged. Prudent environmental management is a new imperative, requiring global cooperation. Like everyone else, the Bank must continue to learn more everyday about environmental management. All the while it must balance environmental long-term goals with steps to help meet the urgent needs of people throughout the developing world.

Entirely new ways of addressing people's relations with nature are needed. It is not enough to add environment projects to the World Bank's lending portfolio. The challenge goes far beyond that. Environmental considerations must be integrated into the mainstream of development thinking. They must be rooted so deeply that they are viewed not as impositions from the outside but as internal imperatives both in developing and developed countries. ■

Environmental considerations must be integrated into the mainstream of development thinking: rooted so deeply that they are viewed not as impositions from outside, but as imperatives both in developed and developing countries.



Homeward bound.
A boy in Ecuador carries water
to his family.



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Nature's gifts can be both used

and saved.

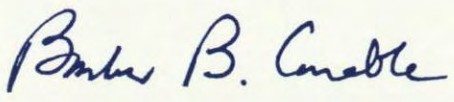
To strike and keep that

balance requires vision, wisdom, and

the coordination of public and

private energies in a partnership for

sustained development.



Barber B. Conable



Terraced fields in Indonesia.

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